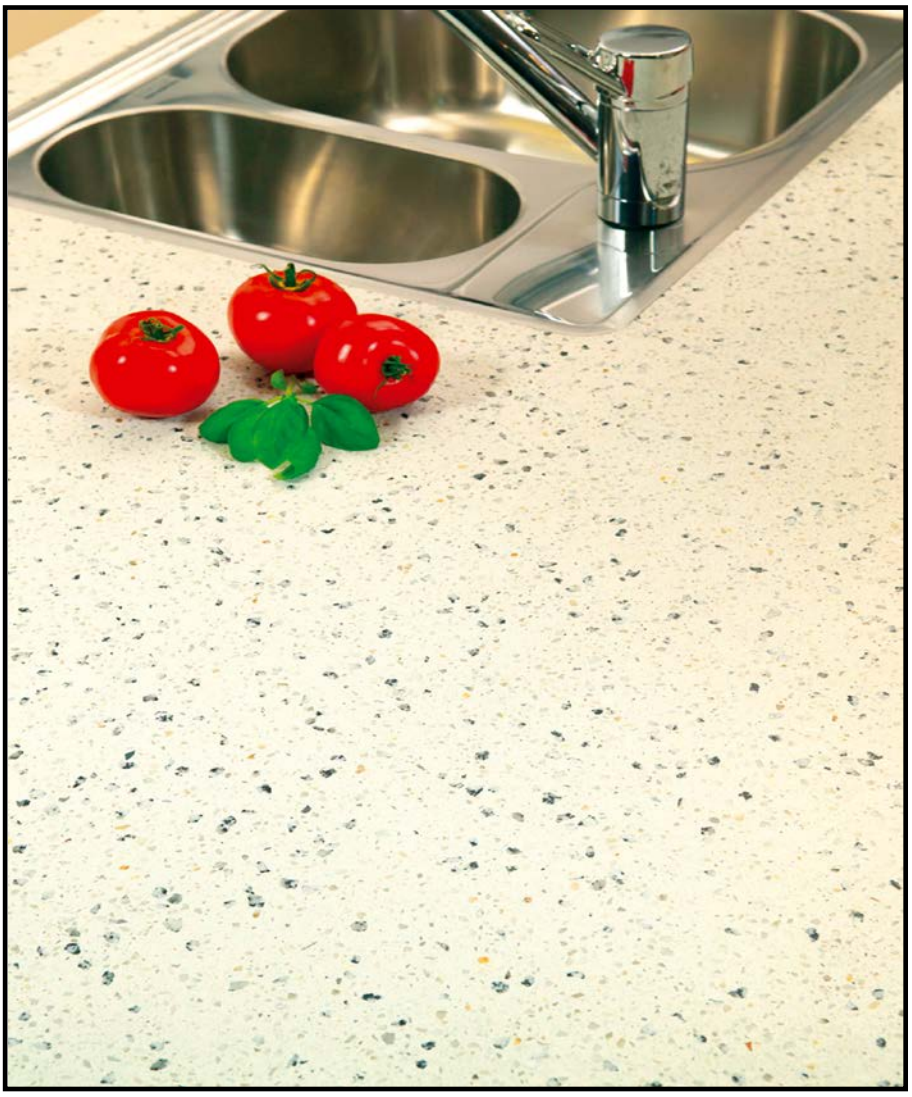

Technical Information

HYRAFIL® 744-300 MST in cold-curing PMMA casting resin

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Introduction

HYDRAFIL® 744-300 MST is a Quarzwerke High Performance Filler GmbH, which is manufactured from synthetic aluminium hydrate by means of an optimized grinding and coating technology. **HYDRAFIL®** 744-300 MST is generally processed in acrylate casting resin recipes. The casting resins are processed into products such as kitchen worktops, “outdoor” applications and board merchandise. High strength, very good thermal shock resistance, elasticity and very good resistance against corrosive media such as steam are of outstanding importance for successful processing into heavy duty components such as kitchen worktops.

In this investigation **HYDRAFIL®** 744-300 MST was tested in comparison with three variants:

Variant A: A silanized aluminium trihydrate - of a good quality as is customary on the market - was tested.

Variant B: A non-treated aluminium trihydrate - of a good quality as is customary on the market - was tested.

Variant C: The non-silanized aluminium trihydrate from variant B was tested. The recipe was admixed for “in-situ” coating of the aluminium trihydrate methacrylsilane.

Summary

The results impressively show the outstanding product quality of **HYDRAFIL®** 744-300 MST:

- The strengths of the composites produced with **HYDRAFIL®** 744-300 MST are up to 50 % higher than those of the comparison variants.
- The breaking elongation is a good 30 % greater than those of the comparison variants. Due to this the composites are characterized by a clearly higher degree of elasticity and improved thermal shock resistance. Furthermore, improved impact resistance is achieved with **HYDRAFIL®** 744-300 MST.
- A distinguishing feature of composites filled with **HYDRAFIL®** 744-300 MST is their excellent steam resistance.

Test set-up

The following basic recipe was used for all tests:

33 parts	of polymer solution consisting of 80 % by weight of MMA and 20 % by weight of PMMA MH 254 (Ineos)
66 parts	of aluminium trihydrate
0.1 parts	of black pigment (Special Black 6, EVONIK Co.)
0.9 parts	of hardener / accelerator for cold-curing PMMA systems

In the case of variant C methacryloxypropyltrimethoxysilane was also added.

The medium grain size of the aluminium trihydrate product used as well as the viscosity and yield point of the manufactured dispersions were determined for the purpose of describing the raw materials.

The dispersions were cast in board moulds and cured at room temperature. Test specimens were cut from the board and then measured by means of a 3-point bending test.

Furthermore, the boards were subjected to hot water at a temperature of 100 °C for 60 minutes. To do so, water was brought to the boil in an Erlenmeyer flask. The Erlenmeyer flask was covered for one hour with the test specimen. The lightening in colour due to the hot steam was assessed visually after drying for 24 hours at room temperature.

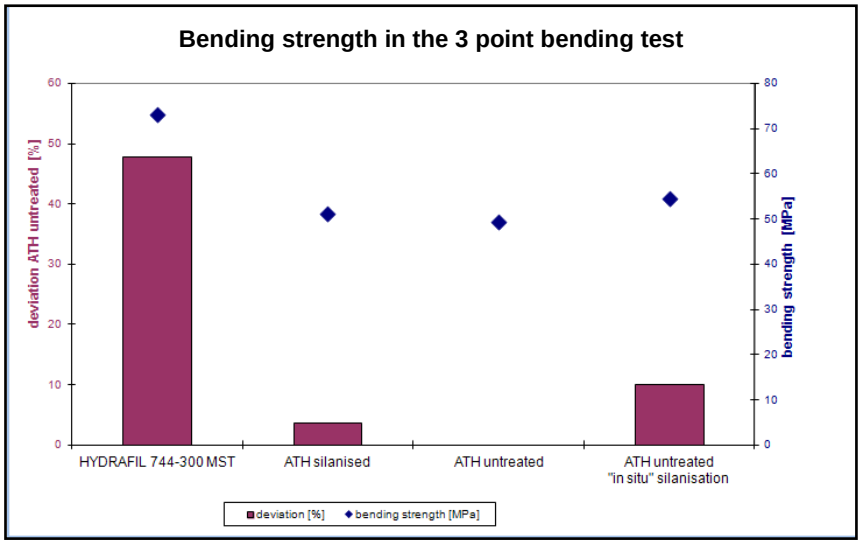
Results

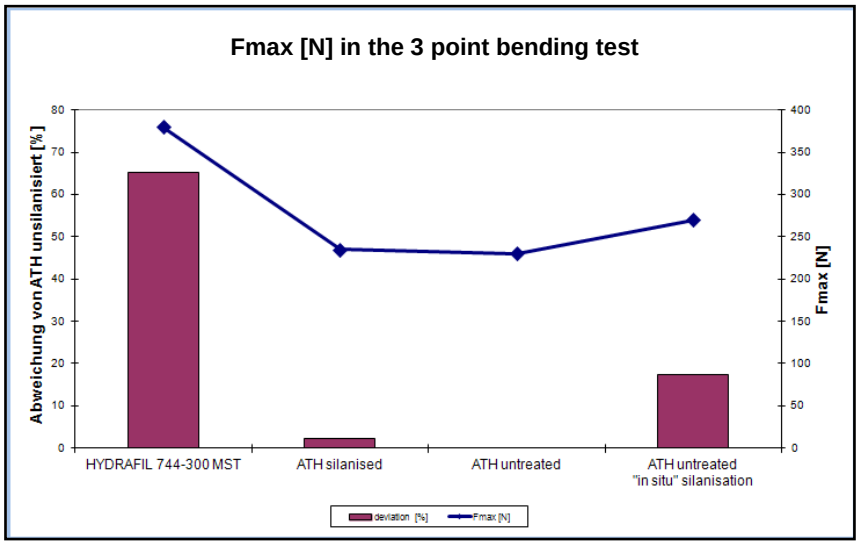
a) Tabular summary of the analysis results

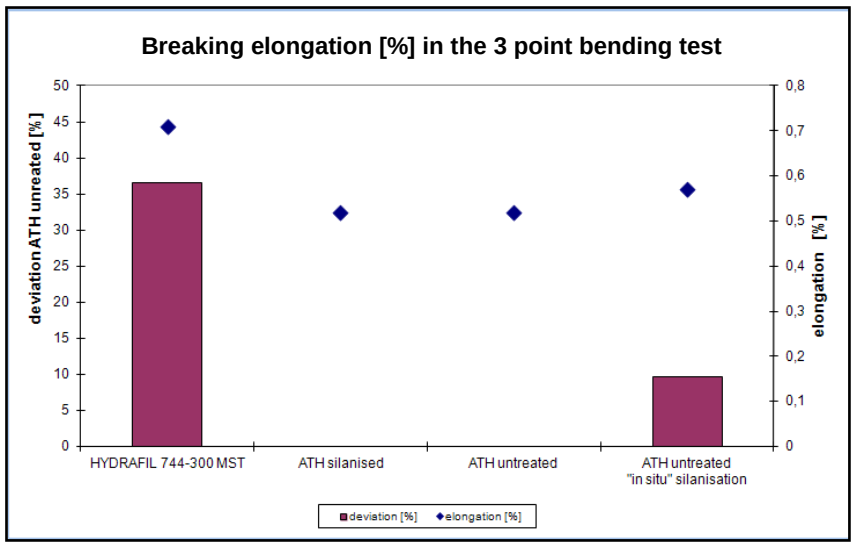
Parameter	Unit	HYDRAFIL® 744-300 MST	ATH silanized	ATH non-treated	ATH non-treated Processing of methacrylsilane in the composite
Analyses for description of the raw material					
Medium grain size	[µm]	12	35	30	30
Viscosity	[Pa s]	1.580	0.915	1.375	1.200
Yield point	[Pa]	0.5	0.5	1.1	1.5
Results of the 3-point bending test					
Young's modulus	[MPa]	11,041	10,912	10,867	10,720
Tensile bending strength	[MPa]	73.2	51.3	49.5	54.5
F_{max}	[N]	380	235	230	270
Elongation	[%]	0.71	0.52	0.52	0.57
Determination of the steam resistance					
Lightening		minimal	intense	very intense	medium to intense

b) Graph of the analysis results

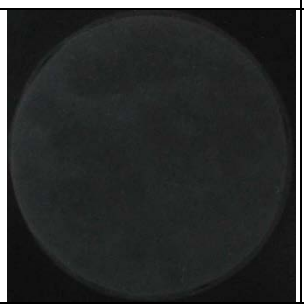
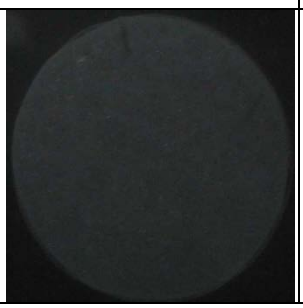
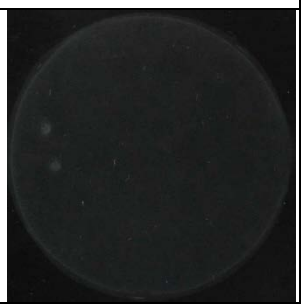
The following diagrams illustrate the intensifying effect of **TREFIL**® 744-300 MST-M in the MMA / PMMA compound. At the same time the breaking elongation and therefore the elastic properties are significantly improved.







c) Assessment of the steam resistance

HYDRAFIL 744-300 MST	ATH silanized	ATH non-treated	ATH non-treated Processing of methacrylsilane in the composite
			

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